JOINT SYMPOSIUM: ESTRO-CIRSE: PERCUTANEOUS ABLATION - HOW IT CAN COMPLEMENT SURGERY AND RADIOTHERAPY

SP-0311
Oncology intelligence approaches: small renal tumours: is it time to stop watching them grow?
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Most small renal tumours that enhance on CT and MRI are renal cell carcinomas. They are usually discovered incidentally. The rate of detection is increasing by 3-4% per year,in parallel with the increased use of cross-sectional imaging. Approximately 25-30% of surgically removed small renal masses are benign; 55-60% are indolent renal cell carcinomas, and only 20-25% have potentially aggressive features, defined by high nuclear grade locally invasive characteristics.
Small renal tumours are often observed rather than operated on immediately, because they are relatively benign, and few metastasize. There have been no documented reports of disease progression in the absence of demonstrable tumour growth. As the incidence of small renal tumour has increased, so has the performance of surgery. However,the increased rate of surgery has not been translated into improved survival. Therefore, it is time to reassess the appropriateness of extirpative surgery for these small masses.
The policy of observing small renal tumours also has to be seriously questioned, because lack of growth does not implicate benignity, 70% of tumours grow under surveillance and 40% of patients cross over to resection during observation. Nephron-sparing treatment of small neoplasms includes partial nephrectomy, thermal ablation and cryotherapy. Percutaneous ablation is usually carried out under CT guidance.The main implications are solitary kidney, renal insufficiency, and multiple tumours, as surgery is particularly problematic in these groups of patients. Ten per cent of patients with solitary kidneys and chronic kidney disease who have partial nephrectomy, progress to renal failure. In a series of 23 tumours in solitary kidneys treated with radiofrequency at Guy's and St. Thomas' Hospital, London, there were four local recurrences, which were subsequently treated successfully. There was no significant difference between the baseline glomerular filtration rate and the GRF at 3, 12 and 24 months. None of the patients required haemodialysis. Percutaneous cryotherapy is similarly successful, and has a very low recurrence rate.
Taking into consideration the very low morbidity of percutaneous thermal ablation and cryotherapy, the time has probably come to abandon the policy of observation of small renal tumours in most patients with this condition.

SP-0312
Image guided percutaneous ablation of pulmonary tumors: how it can complement surgery and radiotherapy ?
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Image guided percutaneous radiofrequency ablation of lung cancer is a thermal destruction of small primary and metastatic lung tumors. Since, its first use in 2000, numerous reports have demonstrated safety and low invasiveness of the technique, rendering possible to treat non surgical candidates, namely with limited pulmonary function or other comorbidities. Indeed, several studies have demonstrated no changes in respiratory function in short or long term.
Complete ablation has been demonstrated in 100% of pathologic studies obtained after radiofrequency ablation of 9 lung metastases measuring 3cm or less. The reported local success rate of ablation is around 90% in a review paper, with even better results for tumor below 2 cm. There is no difference demonstrated in local efficacy in between primary NSLC and lung metastases. Overall survival of treated patient with NSCLC is in between 55 and 60% at 4 years in most recent studies. For colorectal metastasis, a 70% 3-years overall survival is achieved. However, even if survival data are encouraging, improvement of survival after thermal ablationis hard to demonstrate.
Even if some data exists on the synergy of combination of radiation therapy and radiofrequency ablation, they need to be refined.
Consequently today SBRT and thermal ablation challenge the same population of non-surgical candidate and data are lacking to demonstrate superiority of one technique over the other.
Today both SBRT and radiofrequency ablation are limited to non-surgical candidates. A challenge of the future is to determine a subpopulation of patients that can benefit from thermal ablation or SBRT instead of surgery, and still achieved the same survival with improved quality of life and lower morbidity. Patients that benefit today from wedge resection without lymphnode resection are probably the target population, including both very early stage NSCLC and metastases of small size.
Combination of both SBRT and thermal ablation should be evaluated in tumor of larger size because size increase predictive factor of incomplete treatment for both SBRT and radiofrequency ablation.
Both SBRT and thermal ablation are sharing some difficulties in follow-up imaging because the tumor does not shrunk or disappear in the early stage after trea tment.Improvement in follow-up imaging are needed and this effort in improving imaging technique and criteria for response evaluation could be easily shared in between radiation therapist and interventional oncologists through the use of functional imaging.

SP-0313
Emerging techniques in treating hepatic malignancy
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Surgery is the mainstay of liver cancer treatment. Resection and transplantation compete as the first-line option in patients with early-stage hepatocellular carcinoma (HCC) on an intention-to-treat perspective, and achieve the best survival outcomes in well-selected candidates. RFA is the most common treatment offered to early-stage HCC patients who have been rejected for surgery. Recent reports on long-term outcomes of RFA-treated patients have shown that in patients with Child-Pugh class A and early-stage HCC, 5-year survival rates range 50-60%. Therefore, an open question is whether RFA can compete with surgical resection as first-line treatment. Two randomized controlled trials have been reported with opposite results. Thus, at this point there is no unequivocal data to back up RFA as a replacement of resection as first-line treatment for patients with early-stage HCC. While complete removal of neoplastic tissue ("R0" resection) is common after surgery for early-stage HCC, studies in which the pathological specimens of tumors ablated with RFA were analyzed have shown non-negligible rates of incomplete response. Is RFA the best technique for tumor ablation in 2013? Several novel alternate options are currently being explored. These methods – including microwave ablation, cryoablation, and irreversible electroporation (IRE) among others – claim to be able to overcome some of the limitations of RFA. Non-thermal techniques such as IRE have attracted attention, since the issues associated with perfusion-mediated tissue cooling or heating are not relevant. Despite the progress in surgical and ablation techniques, the long-term prognosis of patients with early-stage HCC remains unsatisfactory compared with other common human cancers because of a high recurrence rate. Most resection and ablation series in the literature report a 5-year recurrence rate in excess of 70%, which is the main cause of death. A large trial in which the systemically active, molecular targeted drug sorafenib is used after successful resection or ablation is on-going. The outcomes of this trial are eagerly awaited, as it has the potential to establish, for the first time, an effective adjuvant regimen to improve recurrence-free survival.

SP-0314
Assessing outcomes in local tumour treatment. Lessons learnt from radiation oncology
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Cancer is a major cause of death and morbidity world-wide. It often has a chronic course and the traditional means of treating cancer - surgery, radiation treatment and chemotherapy can in themselves be toxic and cause significant side effects both short and longterm. Cancer and its treatment can result not only in mortality and morbidity, but it imparts a great personal and societal economic burden. The world wide cost of cancer in 2009 was estimated to be US$305 billion with 53% being direct medical costs and 24% due to lost income(1).
The traditional method of assessing tumour response with the RECIST criteria, developed initially in 2000 by the NCI, the NCIC clinical trials group and the EORTC, has been invaluable in producing a set of published rules that define whether target lesions improve (respond), stay the same (stable) or worsen (progressive)(2). More recently in some tumour sites the use of functional PET imaging has shown high predictive value in treatment outcome.
To assess the holistic impact of cancer and treatment however, other methods of assessment are required and are of critical and at times perhaps of overriding importance. Assessing the overall benefit - have

we achieved what we set out to do, have the consequences of treatment been worth the outcome and is this economically viable. The collection of relevant data and its intelligent use is critical. Data that allows measurement of the impact of side effects of treatments both short and long term along a patients entire continuum of care, their global quality of life, the economic impact across the board and whether outcomes have influenced practice, and policy are all important. Knowing how cancer and treatment affect individuals is critical in trying to determine whether any intervention is effective, tolerable and acceptable. The Cancer Outcomes Measurement Working Group (COMWG) has provided a more inclusive method of global assessment[3]. This Group describes current best practices and recommendations for assessing the following three outcomes across the continuum of care: health-related quality of life; economic burden; and patient satisfaction;

The Radiation Oncology community has developed a scoring system for recording Common Toxicity Criteria both for acute and long term symptoms and collection of quality of life data in radiation oncology clinical trials is becoming routine[4]. A number of radiation oncology and medical oncology trials groups have consumers involved in the development of trials and on the trial management committees along with experts in quality of life.

For Interventional Oncology, having access to alarge and relevant data repository that allows for such global evaluation iscritical. Expanding data collection beyond the RECIST criteria to encompass themore global measures discussed above needs to become routine if interventional oncology treatments are to become incorporated into mainstream care, funded andvalued.

1. Breakaway: The global burden of cancer—challenges and opportunities. Economist Intelligence Unit Ltd 2009
2. www.RECIST.com
3. *outcomes.cancer.gov/areas/assessment/comwg.html*
4. *ctep.cancer.gov/reporting/ctc.html*

POSTER DISCUSSION: 9: CLINICAL: BREAST

PD-0315

High precision of MRI-guided target volume delineation before breast-conserving surgery.

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Purpose/Objective: MRI has a high sensitivity for tumor detection and a good correlation with histopathology findings. The precision of preoperative target volume delineation on newly developed 3D supine CE-MRI was compared to preoperative delineation on CE-CT in patients treated with breast-conserving therapy.

Materials and Methods: We tested a newly developed 3D high resolution MRI protocol for target volume delineation in RT supine position in 14 cT1-2N0 patients. Gross tumor volumes (GTVs) were delineated by 4 experienced breast radiation oncologists, following written delineation instructions, on preoperative contrast-enhanced (CE) CT (1x1 mm^2 in plane resolution, 3 mm slice thickness) and 3D CE-MRI (voxel size 1.2x1.2x1.2 mm^3). To assess whether differences in GTV delineation were also clinically relevant, clinical target volumes (CTVs) were created by addition of a 1.5 cm margin around the tumor volume excluding the skin and chest wall. Interobserver variability (IOV) was assessed by calculating the conformity index (CI) and the center of mass distance (dCOM) for both the GTV and CTV in each patient. Tumor characteristics on CE-CT and CE-MRI were assessed and scored by an experienced breast radiologist.

Results: In figure 1, target volume delineations of the 4 observers are shown on both preoperative CE-CT and CE-MRI in the same patient.

The median CI of the GTV was higher on CE-MRI compared to CE-CT (Table 1). After expansion to the CTV, this difference in CI was no longer statistically significant. However, an incorrect GTV was delineated on CE-CT in 2/14 patients (14%) by multiple observers (1/4 and 3/4 observers in each misdelineated patient). This resulted in high ranges of the CI on CE-CT.

Tumor shapes were rated as more irregular and spiculated on CE-MRI. This did not result in a decreased CI on CE-MRI. A uniform volume expansion of GTV to CTV resulted in larger volumes on CE-MRI compared to CE-CT.

No difference in median dCOM was observed between both image modalities.

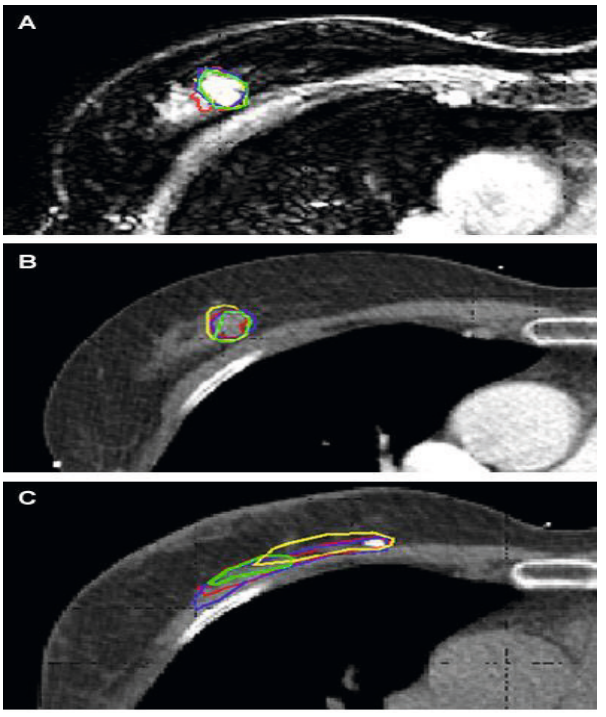

Figure 1 3D GTV delineations of 4 different observers in one patient in the transverse plane at (a) preoperative CE-MRI, (b) preoperative CE-CT, and (c) a clinical example of a postoperative CT.

Table 1 Parameters of interobserver variability (n=14)

	CT		MRI		
	Median	Range	Median	Range	p-value
Mean volume (cm^3)					
GTV	2.9	0.5 - 14.9	2.6	0.7 - 17.0	0.47
CTV	54.0	30.3 - 112.8	60.9	34.5 - 129.4	0.02
Conformity index					
GTV	0.52	0.24 - 0.67	0.60	0.48 - 0.74	<0.01
CTV	0.81	0.38 - 0.85	0.82	0.77 - 0.87	0.11
Mean dCOM (mm)					
GTV	1.5	0.6 - 39.6	1.2	0.5 - 2.3	0.08
CTV	1.7	1.1 - 39.4	1.7	0.8 - 3.4	0.60

CI Conformity Index, GTV gross tumor volume, CTV clinical target volume, dCOM center of mass distance. Mean volume and dCOM were calculated per patient, median values were calculated over the included patient population.

Conclusions: Preoperative target volume delineation showed a higher precision on 3D CE-MRI compared to CE-CT. A more irregular and spiculated tumor was visualized on CE-MRI without a decrease of interobserver agreement. Future studies will focus on using preoperative CE-MRI guided delineation in preoperative, as well as additional information in postoperative, whole or accelerated partial breast irradiation.

PD-0316

Forward planned intensity modulated whole breast hypofractionated radiotherapy: results in 500 patients

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Purpose/Objective: START A and START B studies have demonstrated a similar toxicity obtained by hypofractionation and standard fractionation in whole breast adjuvant radiotherapy. The aim of this study is the evaluation of hypofractionation effect on toxicity in our breast cancer patients.

Materials and Methods: From 02/2009 to 01/2012 500 patients were treated with hypofractionated whole breast radiotherapy, 40 Gy/15 fractions, delivered in 3 weeks, in our institution. Five patients had bilateral treatment. The median patient age was 62 yrs(28-91yrs).